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ARATAKI AOTEAROA

SUMMARY REPORT METHODS FOR DETERMINING THE BENEFITS OF SAFETY AUDIT. A SCOPING STUDY

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TRANSFUND NEW ZEALAND

SUMMARY REPORT METHODS FOR DETERMINING THE BENEFITS OF SAFETY AUDIT. A SCOPING STUDY

Prepared By .....
Ian Appleton, Safety Audit Manager &
Mike Gadd,Civil and Transportation Engineer, Christchurch

Reviewed By .....
P V Wright, Review and Audit Manager

Approved By .....
P V Wright, Review and Audit Manager

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CONTENTS PAGE

Disclaimer for final reports

This is a final report.

This report contains the findings, opinions and recommendations of the consultant who undertook the study.

This report has been prepared for the purpose of assisting Transfund New Zealand to discharge its statutory responsibilities in terms of the Transit New Zealand Amendment Act 1995 and to provide advice to the authorities concerned.

Notwithstanding that this report may contain statements in relation to technical matters, both of a general nature and in relation to specific issues, in no way should readers of the report rely solely on its contents. Readers must seek appropriate expert advice on their own particular circumstances and rely on such advice.

Note: This study was commenced prior to the establishment of Transfund New Zealand consequent upon the Transit New Zealand Amendment Act 1995, which came into effect on 1 July 1996.

SUMMARY REPORT
METHODS FOR DETERMINING THE BENEFITS OF SAFETY AUDIT. A SCOPING STUDY

EXECUTIVE SUMMARY

1. Need for evaluation of the benefits and review of the process

Safety Audit has been introduced as an act of faith in 1993 and with the process now well established. With many hundreds of safety audits completed, it is now appropriate to attempt to measure the benefits and review the methodology.

2. Trials of methods for the scoping report

Trials have been conducted and a scoping report produced which makes recommendations for wider studies. The study comprises three parts:

Stage 1 used a focus group and surveyed the literature and world wide activity. The main objectives of safety audit were found to be: (a) Minimising the risk and severity of crashes; (b) Minimising the need for remedial works; (c) reducing the whole life costs of projects; and (d) improving awareness of safe design practices.

Stage 2 evaluated the findings of stage 1 and recommended trials to be conducted as stage 3.

Three types of method of assessment were explored:(a) those relating to the process; (b) those which are capable of numerical assessment and (c) those which are the subject of opinion.

Stage 3 carried out trials of the methods recommended in stage 2 using actual roading projects and real data, assessed each method and made formal proposals for future work.

The following methods were explored: (a) the investigation of safety audits both as to compliance with procedures and thoroughness; (b) "The Corben Method" in which theoretical crash savings are ascribed to safety audit findings and (c) The "Surrey Method" in which crash data from a group of safety audited sites are compared to data from a similar group of unaudited sites.

3. Findings and Recommendations

The scoping study recommends:

(a) A research project to implement the "Surrey Method"

(b) A research project to implement the "Corben Method"

(c) A survey to determine the awareness of safe design practices

(d) A database of safety audits findings to assist these and any other projects

(e) A review of the safety audit policy, procedures and implementation.

SUMMARY REPORT
METHODS FOR DETERMINING THE BENEFITS OF SAFETY AUDIT. A SCOPING STUDY

1. PURPOSE OF THIS REPORT

The purposes of this report are

- to summarise the methodology and findings;
- to describe future studies based on this work and
- to make interim recommendations.

This summary report is based on four reports prepared by Mike Gadd as part of a contract with Transfund New Zealand. These four reports have been collated in Transfund Review and Audit Division Report no. 96/554S. Copies of this report are available from Transfund's Safety Audit Manager on request.

2. DEFINITION

The words "Safety Audit" mean different things to different people. In the context of this report, the words mean the process described in *Safety Audit Policy and Procedures* Published by Transit New Zealand in August 1993.

To quote from that document, safety audit is:

> *" a formalised process to identify potential safety problems for road users and others affected by the road; and to ensure that measures to eliminate or reduce the problems are considered fully."*

The benefits of safety audit as listed in the *Safety Audit Policy and Procedures* are:

> *"minimise the risk and severity of accidents that may be created by the road project at the site and on the adjacent network;*
>
> *minimise the need for remedial works after construction;*
>
> *reduce the whole life costs of the project; and*
>
> *improve the awareness of safe design practices."*

There are two levels on which the benefits can be assessed. On the macroscopic level, the overall benefits of the process can be better defined and explored. At a microscopic level, the benefits of individual recommendations, in terms of crash and trauma prevention, can be evaluated. To avoid confusion the macroscopic benefits will be termed the "outcomes" of safety audit, whereas the word "benefits" will be reserved for the benefits likely to accrue from the adoption of individual audit recommendations.

3. PURPOSE OF THE SCOPING STUDY

Safety Audit was introduced into New Zealand after research overseas and local trials on state highway projects. However there was no concrete evidence that safety audit does reap the outcomes claimed for it. The claims are made in various guides and manuals. The audit process appeared to encourage good practice in designing for safety. It has been introduced in New Zealand largely as an act of faith.

Also, there was no definition of where outcomes and benefits may be looked for other than an inferred reduction in crashes on projects which have been safety audited. For instance, the greater awareness of safe design practices amongst designers enables them to produce safer designs. A safety audit might identify the need for the development of or improvement to standards.

It is incumbent on the proponents of safety audit to demonstrate that it does result in outcomes and benefits, and if possible, where these might be found.

The purpose of the scoping study was to explore a number of ways in which the outcomes and benefits might be determined and to test the feasibility of them. It makes recommendations for future work.

4. THE SCOPING STUDY METHODOLOGY

The Terms of Reference for this study included three stages.

Stage 1 comprised:

- using a focus group to explore what is meant by "the benefits of safety audit" and what is the potential for measuring them;
- enquiring into the sources of data quoted in the literature for these outcomes and benefits; and
- surveying the literature and consult with known "experts" worldwide to find out what is work is being done elsewhere in this field.

Stage 2 comprised:

- evaluating the methods found in stage 1 using checklist of questions and assess the feasibility of each one; and
- recommending a short list of methods for trialing at stage 3.

Stage 3 comprised:

- testing the practicality of the methods proposed at stage 2 using a small sample of real data;
- reassessing the feasibility of each method; and
- making formal proposals for future work.

5. RESULTS

5.1 Stage 1

A focus group confirmed the outcomes and benefits of safety audit as listed in the *Safety Audit Policy and Procedures* namely to:

> *"minimise the risk and severity of accidents that may be created by the road project at the site and on the adjacent network;*
>
> *minimise the need for remedial works after construction;*
>
> *reduce the whole life costs of the project; and*
>
> *improve the awareness of safe design practices."*

Further outcomes were identified but they were subsets of these ones.

The efficiency of the safety audit process in identifying potential safety problems was flagged as an important component of the study. If the process is inefficient, clearly the full benefits of safety audit will not be achieved.

Potential methods for measurement were identified and tabulated. They were categorised into those capable of factual survey and those which were matters of opinion or attitude.

A literature review and consultation with worldwide "experts" yielded very little in hard factual results in quantifying the benefits. Most references appear to

have originated from sources which stated in essence "If one crash per audit is saved then the benefits are ..." . These are hypothetical statements and of little value. However, useful information was obtained about potential methodologies which could be applied in New Zealand.

A report on trunk road safety audits for the Scottish Office Industry Department provides some subjective post audit monitoring of schemes which was encouraging but contained no factual data.

The most "objective" study found was conducted by Surrey County Council (UK) in which the post construction crash records of 19 audited works were compared with 19 unaudited works. The works were "minor schemes'. The audited sites performed better than the unaudited ones.

The "Surrey" study was the only objective study found from this worldwide search.

5.2 Stage 2

Three types of method were identified:

- those relating to the safety audit process itself;
- those which are capable of producing direct numerical statistical results; and
- those which are the subject of opinion.

The potential methods identified in stage 1 were considered against a checklist of questions, and the ones which appeared to offer the greatest potential are listed here:

- an assessment of the internal efficiency of the safety audit process;
- A method proposed by Bruce Corben, of Monash University Accident Research Centre - in essence this is a hypothetical exercise to evaluate what would have happened if unaudited projects had been audited, and vice versa;
- The "Surrey" method described above, which compares the crash record of safety audited projects with unaudited ones; and
- A market research type survey into practitioners' and managers' awareness of safety matters.

To support these methods, there are some common data requirements which suggest a database of the findings of audits of projects, linked to the LTSA Crash Database, would be worth pursuing. One authority in the UK appeared to use such a database.

5.3 Stage 3

Five state highway projects which had been audited and five state highway projects which had not been audited were used to test the feasibility of the methods identified at stage 2. In addition six local authority projects which had been audited and one local authority project which had not been audited were used. The test was not intended to produce results, but was simply to demonstrate the appropriateness of the methodology.

- The internal efficiency of the safety audit process; This can be tackled in two ways. The first way is simply a compliance audit - were the policy and procedures followed ? The second way is to establish whether all the problems were identified during the audit. This could be done either by re-auditing projects or by inspecting finished works to find out whether problems exist which should have been identified during an earlier audit. From the small sample, all these methods appear practical.

- The "Corben" method; This method would appear to hold the best potential. But the test showed that, while the method appears practical, more work is needed to develop the method. In the first instance, problems would have to be assigned a "degree of severity" until a link to crash prevention could be established. A trial methodology to assign degrees of severity was developed during the scoping study.

- The "Surrey" method described above; the test demonstrated that this method can be applied. On a larger scale, a database of audited and unaudited projects linked to the LTSA crash database would make the data analysis more manageable, as well as providing a basis for study and comparison in future years.

- Survey of practitioners' and managers' awareness of safety matters. A test of such a survey was completed through the IPENZ Transportation Group Newsletter. Ninety eight responses have been received. A report of this trial is included in Report no. 96/554S. While it was only a trial, it was a worthwhile exercise as it has resulted in a wealth of comments about the system which could be of use in any review of the safety audit policy and its application. It is apparent that there is a groundswell of discontent with the performance of some teams.

6. FINDINGS AND CONCLUSIONS

This scoping study was pioneering work. Very few studies have been found overseas, and only one, the "Surrey" method has produced any factual information.

Having elaborated on the possible outcomes and benefits of safety audit, the scoping study explored potential methodologies for measuring these benefits and found a number which appeared to be practical.

Using some real examples of audited and unaudited projects, the scoping study found that three methods were indeed practical to implement. There was some commonality in the data requirements for these methods and therefore a database of safety audits would improve the efficiency of implementing them. Such a database may well have other uses in addition to the needs of these methods.

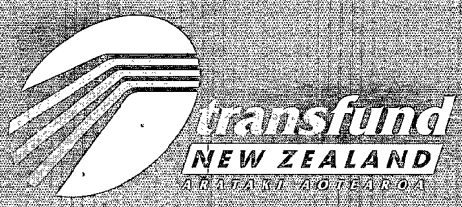
In the course of this scoping study, the efficiency of the safety audit process was found to be an important component of the concept of the benefits of the process. While testing the various methods for measuring the benefits of the process, the consultant became aware of inferences that the safety audit policy and procedures were not being implemented properly. For example, there were instances of dissatisfaction with audit team competence. In addition, there is a lack of feedback about action taken, or not taken, as a result of a safety audit. The potential benefits of safety audit varied widely from project to project.

The scoping study concludes that there are practical methodologies for determining the benefits of safety audit which can be applied in New Zealand. In addition the study has found sufficient evidence to suggest that a thorough review of the safety audit policy and procedures and their implementation is now due.

7. RECOMMENDATIONS

The Scoping Study recommends;

- A research project to implement the "Surrey" Method;
- A research project to implement the "Corben" Method;
- A market research survey to measure the awareness of designers and managers to safe design practices;
- A database of safety audits to assist these and any other projects;
- A review of the safety audit policy and procedures, and its implementation.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